

REACTION IN A BAG - CONSERVATION OF MASS LAB

INTRODUCTION:

"Plop, plop, fizz, fizz oh, what a relief it is," claims an old television ad for a popular antacid. Just what is in the tablet that is relieving the upset stomach? What reaction is causing the fizzing? Can you write a chemical equation for this process? With a bit of investigating, you will be able to discover answer to all these questions.

As you learned in this chapter Antoine Lavoisier, in the 18th century, formulated the "LAW OF CONSERVATION" of mass, which states that matter can neither be created nor destroyed. During a chemical reaction, the bonds of the reactants are broken and rearranged to form new substances. Because matter must be conserved, these new substances, or products, must contain the same number and type of atoms as the reactants.

In this investigation, you will first verify the law of conservation of mass. Then in the second part you will be given some known compounds to react.

PRE-LAB DISCUSSION

1. Define *reactants*:

2. Define *products*:

3. What are the 6 indicators a chemical reaction has happened?

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✓

✓

4. Why is it necessary to use a zip-lock bag?

5. If the density of water is 1.00 g/ml and you measure a volume of 25.00 mL. What is the mass?

6. What is the common name for sodium carbonate?

MATERIALS

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|----------------------|--------------------------|
| ● Goggles | ● Apron |
| ● Graduated Cylinder | ● Zip - lock plastic bag |
| ● Electronic Balance | ● Antacid tablet |
| ● Scoopula or spoon | ● Calcium Chloride |
| ● Sodium Carbonate | ● Phenol red indicator |

PROCEDURE:

PART A~ Antacid tablet

1. Put your goggles and apron on. Measure 25 mL of tap water into a re-sealable plastic bag. Flatten the air out of the bag and seal it. Record its mass in data table 1.
2. Record the mass of the antacid tablet in data table 1.
3. Tip the bag sideways, and while holding the bag, pour 25 ml of water into one corner.
4. Place the antacid tablet in the bag, but DO NOT LET IT TOUCH THE WATER.
5. Seal the plastic bag, while still holding onto the tablet and the water in the corner of one of the bags.
6. Let the tablet drop into the water.
7. Observe the reaction until it comes to a complete stop. You will know this when the bubbling and fizzing stop.
8. Mass the bag and all the reactants and products and record the mass in data table #1.

PART B - CaCl_2 , NaHCO_3 and water

1. Calculate the total mass of the bag and reactants in each reaction and record these values in the appropriate data table.
2. Using the formula for the density of water, calculate the mass of the water. Record the results in data table #2.
3. Add 1 scoop of calcium chloride, CaCl_2 , to the second plastic bag.
4. Add 1 scoop of sodium carbonate, Na_2CO_3 to the bag, and shake gently to mix.
5. Determine the mass of the bag and its contents. Record this value in data table 2.
6. Measure 25 mL of water into the graduated cylinder. Add 5 drops of phenol red indicator to the water.
7. Tip the bag sideways, and while holding the solids in the bottom corner, pour the liquids in the other corner. Twist the bag if you like so the solids will not get wet from the water/phenol red.
8. Keeping the trapped air to a minimum, reseal the bag. Hold the bag and let the liquid move from one end of the bag to the other until the contents are mixed.
9. Observe the reaction until it comes to a complete stop. Record your observations.
10. Record the mass of the unopened bag in data table #2. Clean up your work area and wash your hands before leaving the lab.

OBSERVATIONS

Data Table #1 - Do not forget units!!!!

Mass of bag and water		Write observations here:
Mass of antacid tablet		
Mass of all reactants (mass of bag and water + mass of antacid tablet)		
Mass of bag and products		

Data Table #2 - Do not forget units!!!!

Mass of bag and dry reactants		Write observations here:
Volume of water		
Mass of water (hint: $D = M/V$ ~ pre-lab question)		
Mass of all reactants (mass of bag + mass of water + dry reactants)		
Mass of bag and products		

ANALYSIS AND CONCLUSION:

- How do the values for total mass before and after each reaction demonstrate the law of conservation of mass?
 - If your values do not match, what is a possibility for this discrepancy?
- In part A did you observe a physical or chemical change to the antacid tablet? What is your evidence for this observation?
- In part B did you observe a physical or chemical change to the antacid tablet? What is your evidence for this observation?
- What are 3 physical properties of the antacid tablet?
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- What are 3 physical properties of the calcium chloride CaCl_2 ?
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- What are 3 physical properties of the baking soda (NaHCO_3)?
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- Phenol red is an indicator. That turns yellow when present in an acidic solution. What your bag acidic or basic?